

all cases the soils in which the roots were imbedded proved to be highly calcareous, even though the adjoining rocks were not.

In view of the above results it seems obvious that in the study of the habitats of plants, such as these ferns, the mere superficial recording of the kind of rock is inadequate, and may lead to erroneous conclusions. The nature of the soil upon the rock is the important factor, and this should always be examined to find out whether, instead of being derived from the rock, it may not consist essentially of decayed vegetable matter. In the latter case, lime-loving plants may be enabled to thrive even though the underlying rock is wholly non-calcareous.

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Cheilanthes lanosa and Isoetes in Indiana

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The only record for *Cheilanthes lanosa* (Michx.) Watt for Indiana is contained in a list of the "Plants of the Lower Wabash Valley" by Dr. J. Schneck. This list was published by the Indiana Geological Survey in 1876. The area included in the title "Lower Wabash Valley" is that below the confluence of White River of Indiana. The Indiana territory included was parts of Gibson and Posey Counties. The habitat of *Cheilanthes lanosa* is given as rocky ledges. In Gibson and Posey Counties there are no rocky ledges, except a few low sand-stone ledges on the "Gordon Hills" in Gibson County, and a few low limestone ledges along the Wabash River below New Harmony. The writer has searched all of these and has failed to find the fern referred to, although the pressure of forty years of civil-

⁶ Since this paper was written transferred to the Bureau of Chemistry.

ization since the report was made may have exterminated it. Further, the writer purchased all of the Indiana specimens contained in the Schneck herbarium, and this fern was not in the lot. From a consideration of the preceding facts, it is believed that Schneck did not find his specimen in Indiana, but in one of the adjoining counties of Illinois, which has rocky ledges.

On June 29, 1915, the writer found this species in Perry County about six miles east of Cannelton on the top of the high rocky bluff of the Ohio River. It was noted but once, and was located on the top and near the edge of a high perpendicular ledge of rock. The specimens formed a mat over an area about two feet long and a foot and a half wide.

On July 10, 1915, I again found this species in Martin County in the crevices of a rocky bluff along White River about five miles north of Shoals. The rocky ledges at this place are locally known as the McBride bluffs. Here it is sparingly found in isolated tufts. It is of interest to note that *Polypodium polypodioides* (L.) Hitchc. covered large areas of the perpendicular ledges at this place. This is the most northern location for the latter species in Indiana.

The genus *Isoetes* was not known in Indiana until I found *Isoetes foveolata* A. A. Eaton in Harrison County, June 25, 1915. This species was found in abundance in a low woods four miles south and one mile east of Palmyra. It formed a mass about four feet wide and twenty-five feet long. It was located in a long ago abandoned logging road through a thick woods of tall trees. The trees nearest were *Liquidambar*, *Quercus palustris*, *Nyssa sylvatica* and *Acer rubrum*. The only herbaceous plants nearby were *Ludwigia palustris* and *Samolus floribunda*.

An additional species of *Isoetes* was found in Crawford County on Oct. 12, 1916. It was located in a small

pond in a field near the north side of an east and west road, and about one mile east of Pilot Knob hill. The pond was dry on this date, but the species is submerged in this pond the greater part of the year. This species proved to be *Isoetes Braunii* Durieu. Both species of *Isoetes* were determined by Prof. L. S. Hopkins. Specimens of the species of ferns and quillworts mentioned in this paper have been distributed among the larger herbaria of the United States.

BLUFFTON, INDIANA.

Experiences with a Fern Garden—II

C. L. GRUBER

In August, 1911, a magnificent specimen of the common brake, four feet high, was brought home and planted in the yard along a wire-netting fence. On account of its weedlike propensities I did not trust it in the fern bed. In 1912 it sent up eight fronds, but none half so high as the one I planted; but in 1913, when more than thirty-five fronds were produced, a number were nearly as tall as the original one. I set a barrier of boards, ten inches wide, into the ground to confine the ferns within a given space, but some rootstocks dived beneath the boards and sent up fronds six inches to four feet away, several coming up out of a bank eighteen inches above the level of the area in which I had attempted to inclose them. The bracken usually begins to grow during the last week in April. Practically all the fronds are fertile and the brown sporangia ripen from the middle of June till into September.

From a station thirty miles away I brought three plants of the purple-stemmed cliff brake and set them in my fern garden in August, 1911. I planted one of them in the open ordinary soil, another at the base of